

# Study on Reconstructing **Disaster Propagation Patterns** to Evaluate **Evacuation Actions** in Emergencies with **Adequate Lead Time**

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# Introduction - Background

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- **Response phase is critical** among all phases of the disaster management – including prevention, preparedness, response and recovery.
- The Korean government's **inadequate response to the 2014 Sewol Ferry Tragedy** became a catalyst for the impeachment of President Park Geun-Hye



# Introduction - Purpose

We must never make mistakes in emergency situations.

So how should we prepare?

We need to learn lessons from the actions taken in past disaster propagation patterns.

We should be trained to know how to act if we find ourselves in a similar situation.

# Introduction - Objectives

To develop a practical tool for reconstructing Disaster Propagation Patterns (DPPs)

To reconstruct DPPs for emergencies that provide adequate lead time for evacuation

To evaluate evacuation actions as illustrated by reconstructed DPPs

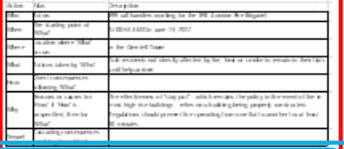
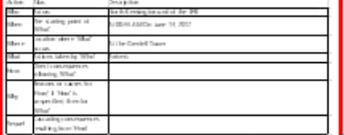
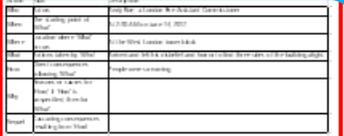
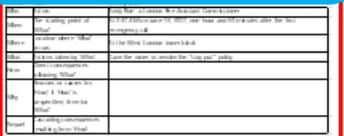
To identify critical lessons from DPPs for enhancing survival in future disasters

# Introduction - Scope

- Developing a tool for reconstructing DPPs
- Reconstructing DPPs of four cases with adequate lead time using the tool, the Hazard-Action
  - 2011 Okawa Elementary School Tragedy in Japan
  - 2014 Sewol Ferry Tragedy in Korean
  - 2017 Grenfell Tower Fire in London
  - 2011 Kimaishi Miracle
- Evaluating actions taken by on-site commanders and followers in the four cases
- Reviewing efficiency of the Hazard-Action

# How to reconstruct Disaster Propagation Patterns (DPPs)

- A Disaster Propagation Pattern (DPP) is considered a **disaster story** reconstructed along a timeline.
- It is built using the **Hazard-Action** Tool, which consists of two columns.
- Each column contains important scenes.
- Each scene is described using the Enhanced 5W1H (E5W1H) framework.
- E5W1H consists of the following seven components :  
When, Where, Who, What, How, Why, Sequel, and Image.

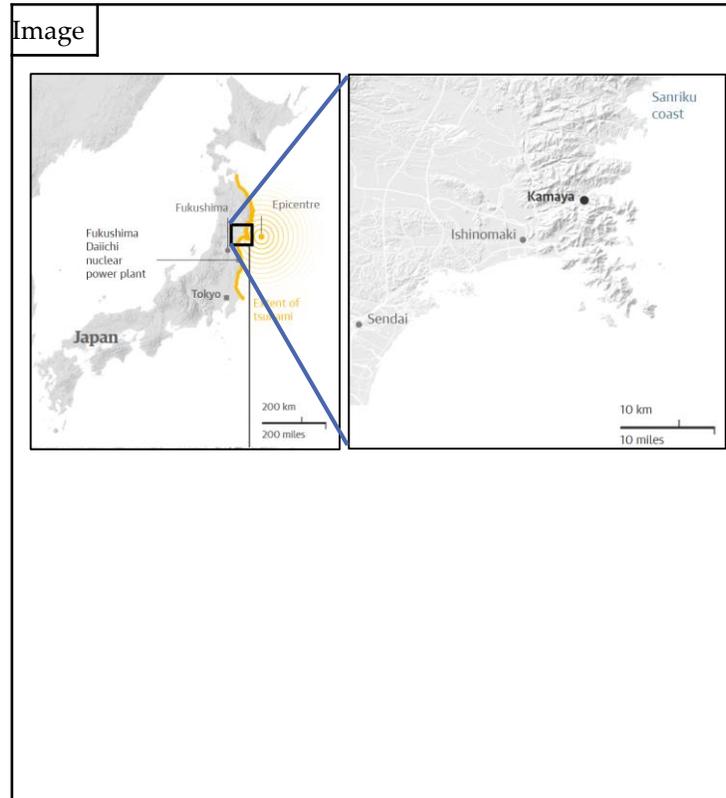
	Hazard column	Action column	
Scene #1			
Scene #2			Scene #2
Scene #3			
Scene #4			Scene #4
Scene #5			
Scene #6			Scene #6
Scene #7			

# How to reconstruct Disaster Propagation Patterns (DPPs) – E5W1H

E5W1H	Hazard Column	Action Column
Who	Hazards	<u>Actors</u>
When	The starting point of 'What'	The starting point of 'What'
Where	Location where 'What' occurs	Location where 'What' occurs
What	Emergencies caused by 'Who'	<u>Actions taken by 'Who'</u>
How	Direct consequences following 'What'	Direct consequences following 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Reasons or causes for 'How'; if 'How' is not specified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Cascading consequences resulting from 'How'
Image	Visual materials to facilitate understanding	Visual materials to facilitate understanding

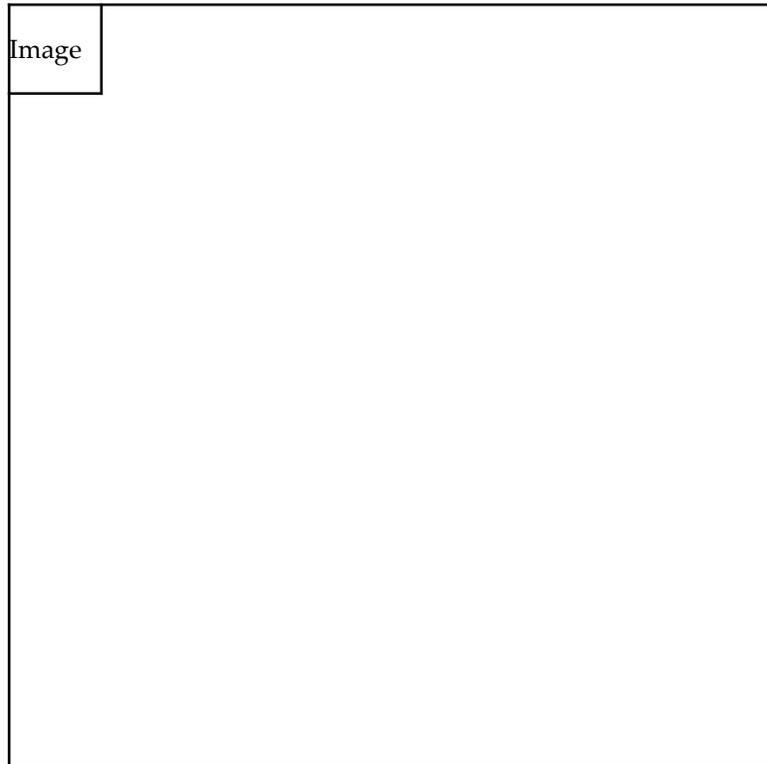
# DPP of the Okawa Elementary School Tragedy in Japan (Scene#1)

Hazard Alias		Description
Who	Hazards	An <b>earthquake</b>
When	The starting point of 'What'	<b>At 2:45 PM</b> on March 11, 2011
Where	Location where 'What' occurs	At Nirashima-94 Kamaya, Ishinomaki, Miyagi
What	Emergencies caused by 'Who'	<b>Hit Okawa Elementary School</b>
How	Direct consequences following 'What'	Students and teachers in the classrooms <b>went out and gathered in the playground</b> , lined up by class.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Because of the emergency action plan.
Sequel	Cascading consequences resulting from 'How'	



14 scenes

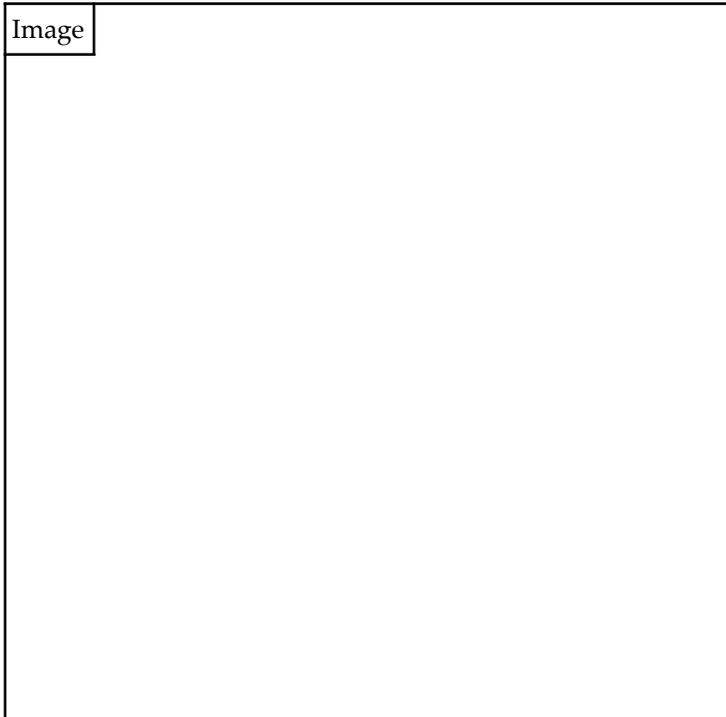
# DPP of the Okawa Elementary School Tragedy in Japan (Scene#2)



Action	Alias	Description
Who	Actors	<b>The Japan Meteorological Agency</b>
When	The starting point of 'What'	<b>At 2:59</b> PM on March 11, 2011
Where	Location where 'What' occurs	In northeastern Japan
What	Actions taken by 'Who'	Issued a warning: <b>A six-meter-high tsunami</b> was expected; everyone on the coast of northeastern Japan was advised to evacuate to higher ground
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#3)

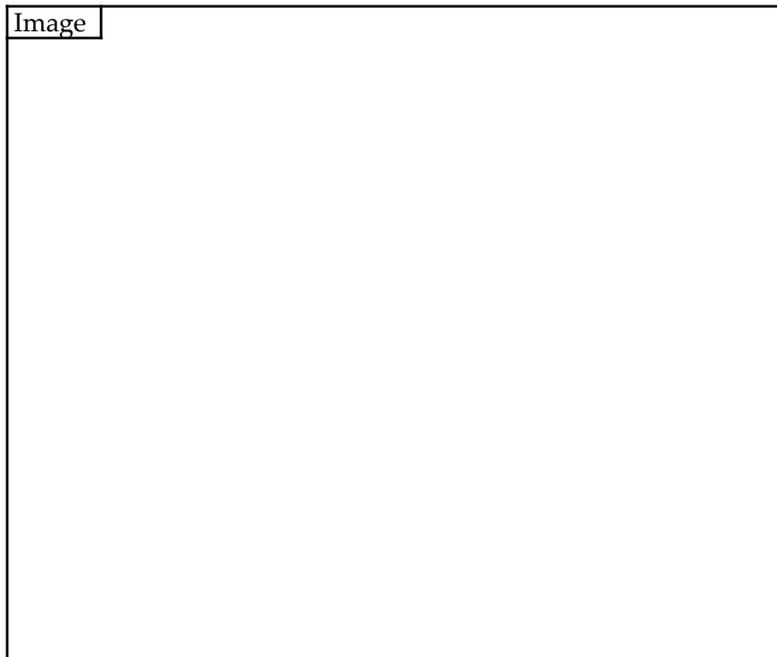
Hazard	Alias	Description
Who	Hazards	<b>Aftershocks</b>
When	The starting point of 'What'	<b>At 3:03 PM, 3:06 PM, and 3:12 PM</b> on March 11, 2011
Where	Location where 'What' occurs	At Nirashima-94 Kamaya, Ishinomaki, Miyagi
What	Emergencies caused by 'Who'	<b>Continued to shake Okawa Elementary School</b>
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	



The thumbnails on the right side of the slide are as follows:

- Thumbnail 1:** A map of Japan with a red dot indicating the location of the Okawa Elementary School.
- Thumbnail 2:** A photograph of the Okawa Elementary School building.
- Thumbnail 3:** A photograph of a large fire or explosion at the school.
- Thumbnail 4:** A photograph of a large fire or explosion at the school.
- Thumbnail 5:** A photograph of a large fire or explosion at the school.
- Thumbnail 6:** A photograph of a large fire or explosion at the school.
- Thumbnail 7:** A photograph of a large fire or explosion at the school.
- Thumbnail 8:** A photograph of a large fire or explosion at the school.
- Thumbnail 9:** A photograph of a large fire or explosion at the school.
- Thumbnail 10:** A photograph of a large fire or explosion at the school.
- Thumbnail 11:** A photograph of a large fire or explosion at the school.
- Thumbnail 12:** A photograph of a large fire or explosion at the school.
- Thumbnail 13:** A photograph of a large fire or explosion at the school.
- Thumbnail 14:** A photograph of a large fire or explosion at the school.
- Thumbnail 15:** A photograph of a large fire or explosion at the school.

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#4)



	Action Alias	Description
Who	Actors	The Japan Meteorological Agency
When	The starting point of 'What'	<b>At 3:14</b> PM on March 11, 2011
Where	Location where 'What' occurs	In northeastern Japan
What	Actions taken by 'Who'	Updated its warning: The tsunami was expected to reach <b>a height of 10 meters.</b>
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

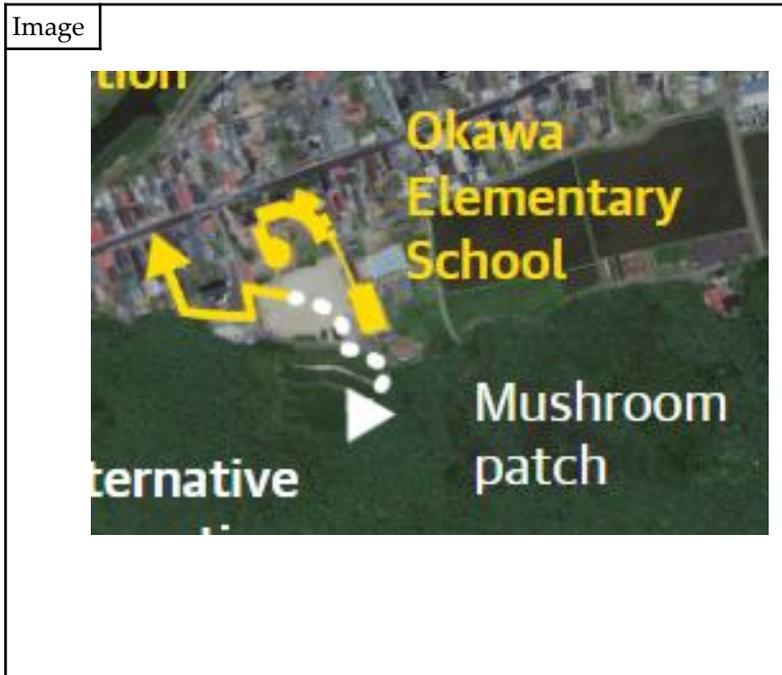
# DPP of the Okawa Elementary School Tragedy in Japan (Scene#5)

Image	
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	Action Alias	Description
Who	Actors	The <b>deputy headmaster</b> , Toshiya Ishizaka, who was responsible for revising the Education Plan.
When	The starting point of 'What'	Around 3:14 PM on March 11, 2011
Where	Location where 'What' occurs	In the playground
What	Actions taken by 'Who'	<b>Was trying to direct emergency actions</b> during the tsunami according to the Education Plan.
How	Direct consequences following 'What'	He found only these vague words in the Education Plan to puzzle over: "Primary evacuation place: school grounds. <b>Secondary evacuation place, in case of tsunami: vacant land near school, or park, etc."</b>
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Because he left the generic wording of the template (the Education Plan) unchanged.
Sequel	Cascading consequences resulting from 'How'	The school was located immediately in front of a forested hill, 220 meters high at its highest point. He didn't consider the hill to be vacant land or a park.

The image strip contains 12 thumbnails. The first thumbnail is highlighted with a blue box and has a blue arrow pointing to the 'How' row of the table. The thumbnails show: 1. A map of the school's location. 2. A sign for 'Okawa Elementary School'. 3. A playground area. 4. A large speaker. 5. A fire or explosion. 6. A map of the school grounds. 7. A building. 8. A building. 9. A building. 10. A building. 11. A building. 12. A building.

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#6)

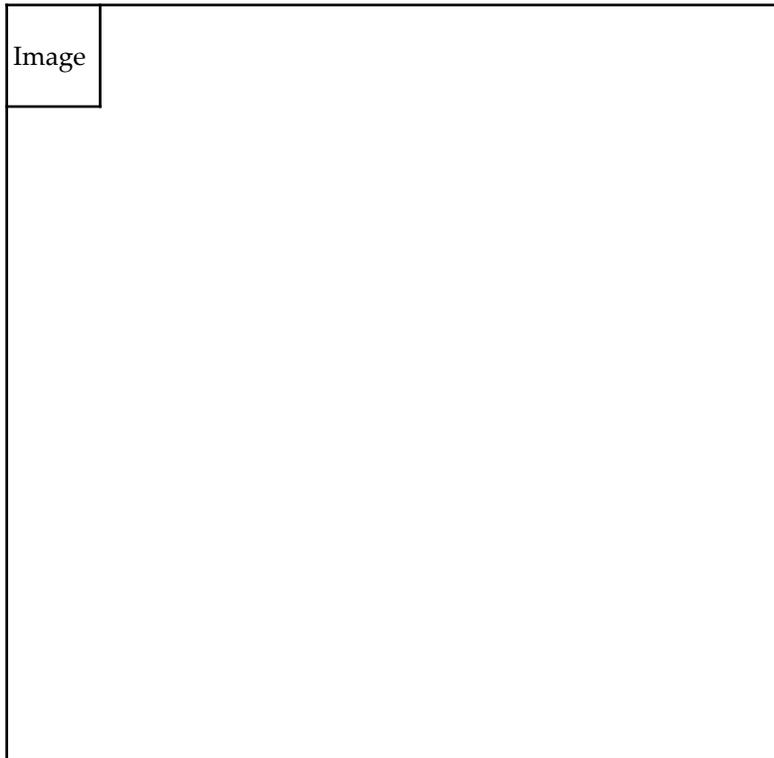


Action	Alias	Description
Who	Actors	<b>A senior teacher, Junji Endo</b>
When	The starting point of 'What'	
Where	Location where 'What' occurs	In the playground
What	Actions taken by 'Who'	Asked Ishizaka: <b>"What should we do? Should we run to the hill?"</b>
How	Direct consequences following 'What'	Endo was told that <b>it was impossible due to the shaking.</b>
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#7)

Image			
	Who	Actors	Parents and grandparents of the students
	When	The starting point of 'What'	
	Where	Location where 'What' occurs	In the playground
	What	Actions taken by 'Who'	Arrived by car or on foot to <b>pick up their children.</b>
	How	Direct consequences following 'What'	They stayed in the playground.
	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Because <b>the teachers told them it was better to stay at school.</b>
	Sequel	Cascading consequences resulting from 'How'	

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#8)



Action Alias		Description
Who	Actors	<b>Local people from the village</b>
When	The starting point of 'What'	
Where	Location where 'What' occurs	In the playground
What	Actions taken by 'Who'	Arrived at Okawa Elementary School, which was designated as an <b>official evacuation site</b> for the village of Kamaya.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

The storyboard panels contain the following text:

- Panel 1: The starting point of 'What' is the beginning of the scene. The scene is set in the village of Kamaya.
- Panel 2: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 3: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 4: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 5: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 6: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 7: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 8: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 9: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 10: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 11: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 12: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 13: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 14: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 15: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 16: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 17: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 18: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 19: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.
- Panel 20: The scene is set in the village of Kamaya. The scene is set in the village of Kamaya.

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#9)



	Action Alias	Description
Who	Actors	Toshinobu Oikawa, <b>a worker</b> at the local branch of the <b>Ishinomaki town government.</b>
When	The starting point of 'What'	<b>At 3:25 PM</b>
Where	Location where 'What' occurs	Around Okawa Elementary School
What	Actions taken by 'Who'	<b>Was driving fast and shouting</b> through the car's loudspeaker: " <b>A super-tsunami</b> has reached Matsubara. Evacuate! <b>Evacuate to higher ground!</b> "
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

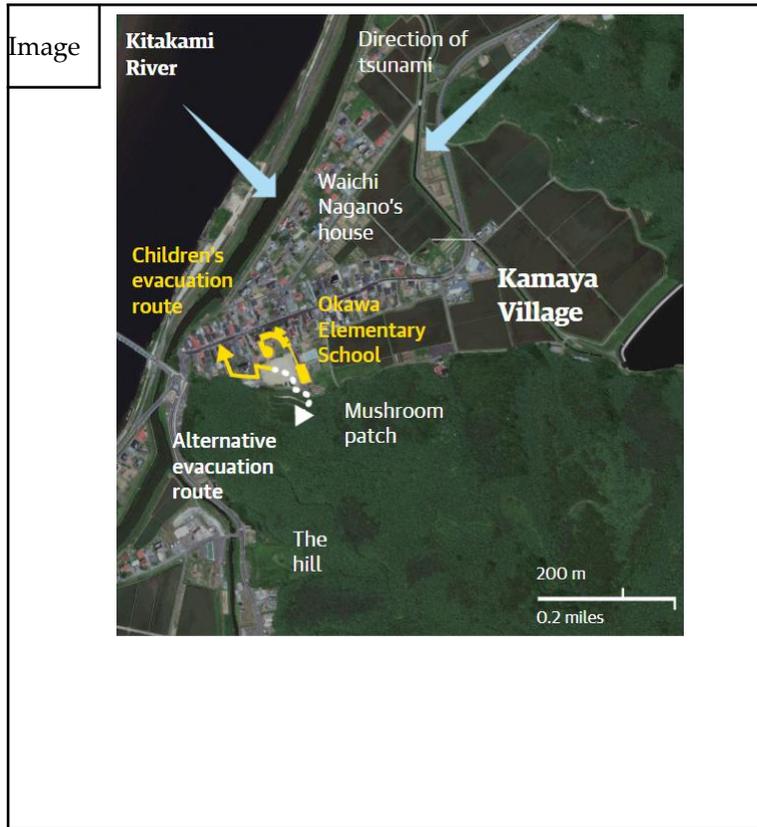
# DPP of the Okawa Elementary School Tragedy in Japan (Scene#10)



	Action Alias	Description
Who	Actor	The teachers
When	The beginning of 'What'	<b>At 3:25 PM</b> , Oikawa and the three loudspeaker vans drove past.
Where	Currently or potentially affected areas	In the school playground
What	Actions that actors take	<b>Were preparing to burn wood</b> in oil drums to keep the children warm.
How	Direct consequences of 'What'	
Why	Causes or reasons for 'How'; if 'How' is not specified, then for 'What'	
Sequel	Cascading Consequences	

The storyboard on the right illustrates the sequence of events in the scene. A blue box highlights a specific panel that contains an image of the burning wood drum, which is linked to the 'What' row of the table above. The storyboard panels include various elements such as character names, descriptions, and visual aids like maps and diagrams.

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#11)



Action	Alias	Description
Who	Actors	The <b>deputy headmaster</b> , Toshiya Ishizaka
When	The starting point of 'What'	Around <b>3:30 PM</b>
Where	Location where 'What' occurs	In the school playground
What	Actions taken by 'Who'	Called out, "A tsunami seems to be coming!" <b>"Quickly! We're going to the traffic island.</b> Get in line, and don't run."
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#12)

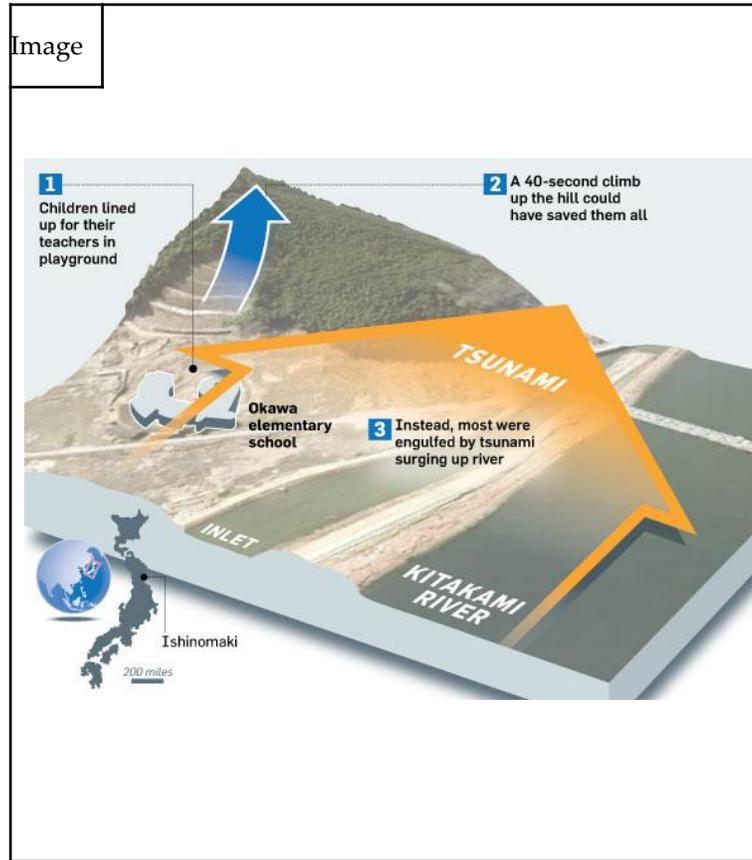
Image	

Action Alias		Description
Who	Actors	<b>An elderly man</b> named Kazuo Takahashi, who suddenly became aware of the tsunami.
When	The starting point of 'What'	At <b>3:30 PM</b>
Where	Location where 'What' occurs	Near the school playground
What	Actions taken by 'Who'	Parked his car next to the school. As he climbed out and headed for the hill, he <b>saw a large number of children rushing out of the school</b> in a hurry.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

The strip contains 12 thumbnails, each with a small table of metadata. The 5th thumbnail, highlighted by a blue arrow, shows a large outdoor speaker. Other thumbnails include maps, school buildings, and people.

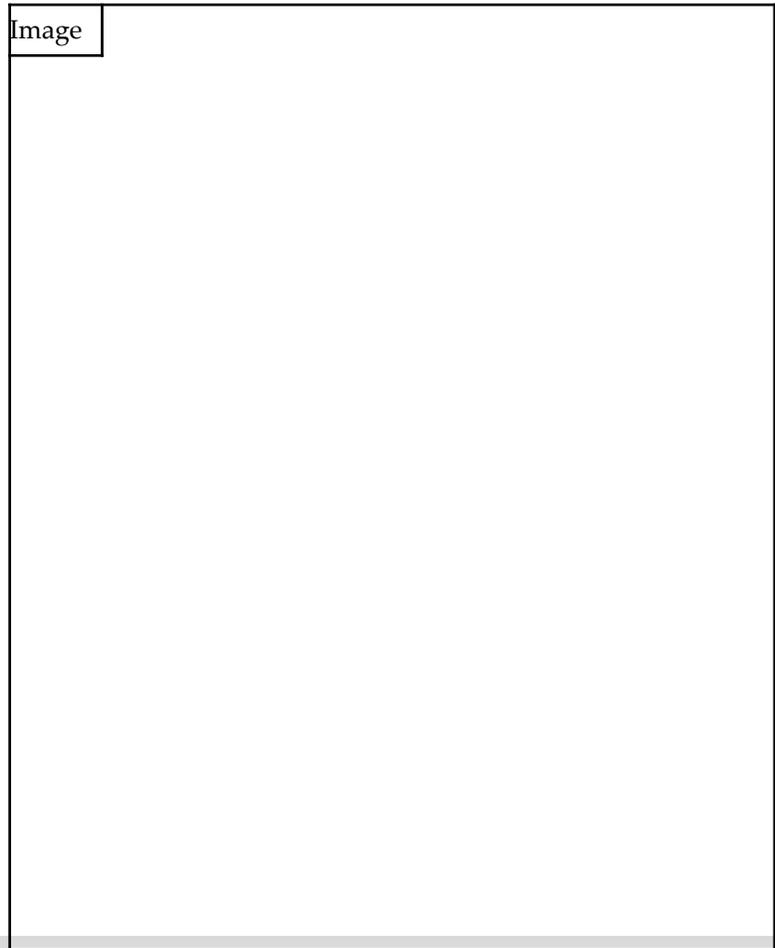
# DPP of the Okawa Elementary School Tragedy in Japan (Scene#13)

	Hazard Alias	Description
Who	Hazards	<b>The tsunami</b> , a sheet of white spray rising above the dark waters.
When	The starting point of 'What'	<b>Barely a minute</b> had passed since they left the playground.
Where	Location where 'What' occurs	Near the school
What	Emergencies caused by 'Who'	Moved in the direction where the children had been ordered to evacuate and <b>engulfed them.</b>
How	Direct consequences following 'What'	Of the 78 students present at the moment of the tsunami, <b>74</b> , along with <b>10</b> out of the 11 teachers, <b>lost their lives.</b>
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	



A vertical strip of 13 small thumbnail images, each with a corresponding text box. The thumbnails include: a map of Japan, a satellite view of the school area, a 3D diagram of the tsunami (identical to the main image), a close-up of a tsunami wave, and a close-up of a tsunami wave. The text boxes contain descriptive text for each scene, including details about the tsunami's height, the school's location, and the impact on the children and teachers.

# DPP of the Okawa Elementary School Tragedy in Japan (Scene#14)



	Action Alias	Description
Who	Actors	The <b>Sendai High Court</b>
When	The starting point of 'What'	On 26 April, <b>2018</b>
Where	Location where 'What' occurs	
What	Actions taken by 'Who'	Ordered the governmental authorities to <b>pay around 1.4 billion yen</b> (\$13 million) in damages to the families of the pupils, raising the amount of compensation by about 10 million yen from a lower court ruling.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	The authorities "failed to fulfill their obligation to revamp a risk management manual in line with the realities of Okawa Elementary School," Presiding Judge Hiroshi Ogawa said, adding, " <b>If the manual had designated a 20-meter-high location for evacuation" the deaths could have been prevented.</b> "
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)

Image



E5W1H Alias	Description
Who	Captain Lee Joon-Seok of the <b>Sewol ferry</b>
When	The starting point of 'What' At 9:05 PM on April 15, 2014
Where	Location where 'What' occurs At the Coastal Passenger Terminal in Incheon Port
What	Actions taken by 'Who' <b>Departed with 29 crew members, 325 students, 14 teachers, 108 civilians, and 2,142.7 tons of cargo onboard</b>
How	Direct consequences following 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'

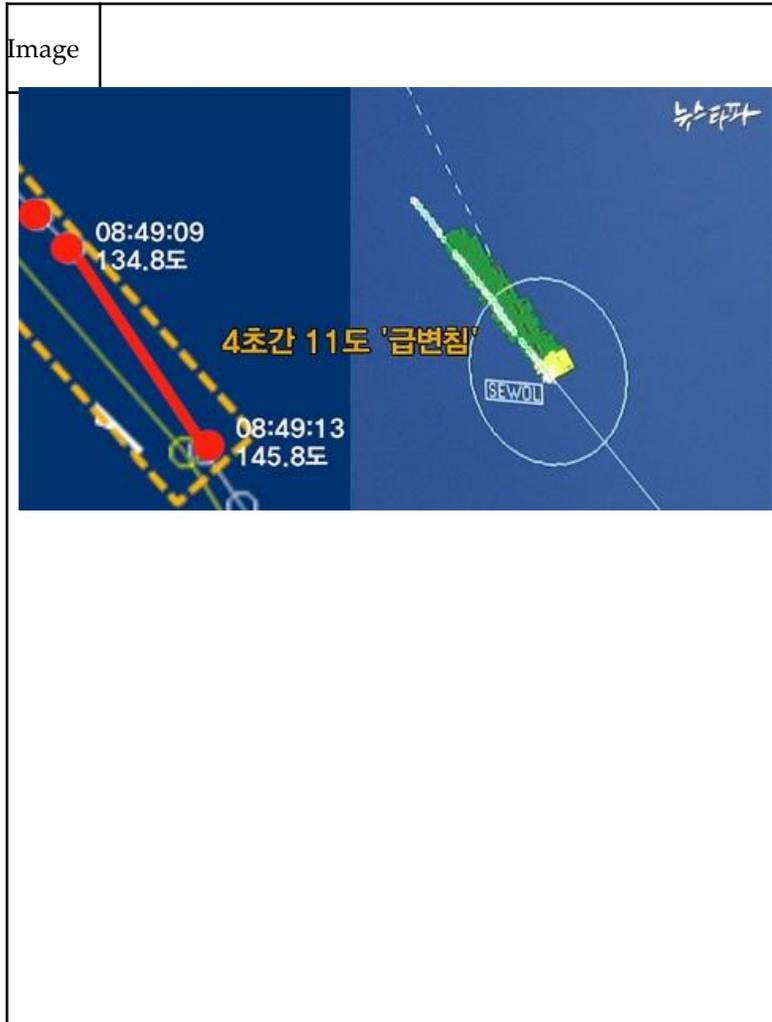
9 scenes

# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)



	E5W1H Alias	Description
Who	Actors	<b>The third officer on duty, who was responsible for navigation</b>
When	The starting point of 'What'	<b>At 8:46 AM</b> on April 16, 2014
Where	Location where 'What' occurs	In the waters east of Byeongpungdo, Jindo-gun, Jeollanam-do
What	Actions taken by 'Who'	Gave the first helm order to the duty helmsman to <b>change the course from 135 degrees to 140 degrees</b> while passing through the waters east of Byeongpungdo
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)

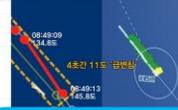


E5W1H Alias	Description
Who	Actors <b>The third officer</b> on duty
When	The starting point of 'What' <b>At 08:49 AM</b> on April 16, 2014
Where	Location where 'What' occurs In the waters east of Byeongpungdo, Jindo-gun, Jeollanam-do
What	Actions taken by 'Who' <b>Issued a second course change order to 145 degrees</b>
How	Direct consequences following 'What' <b>The vessel failed to stabilize on the intended course</b> and began turning rapidly to starboard
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Due to the duty helmsman's poor steering skills
Sequel (1)	Cascading consequences resulting from 'How' In response, the third officer instructed the helmsman to steer to port to counteract the unintended turn.
Sequel (2)	Cascading consequences resulting from 'How' However, the Sewol ferry continued to turn rapidly to starboard, <b>causing an excessive outward heel to port.</b>
Sequel (3)	Cascading consequences resulting from 'How' As a result, poorly secured cargo and other onboard items shifted, further increasing the vessel's list to port.

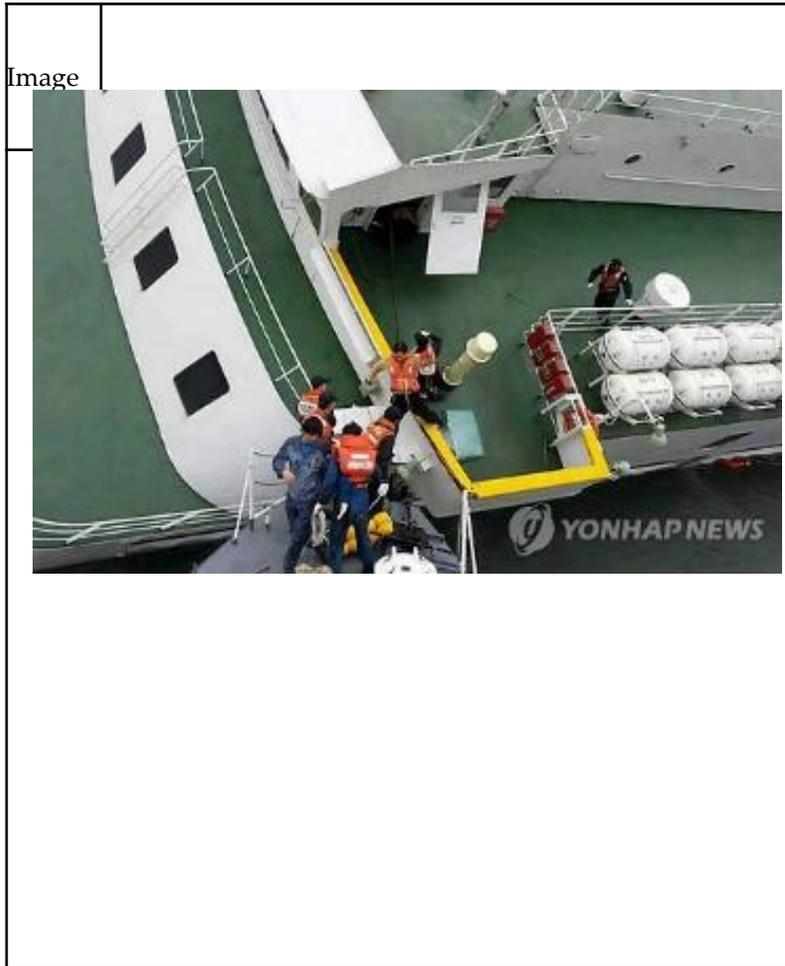
# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)



E5W1H Alias	Description
who	Actors Hye-Sung Gang (33), <b>a crew member of the Sewol Ferry</b>
When	The starting point of 'What' From 8:55 AM to 9:20 AM on April 16, 2014
Where	Location where 'What' occurs Inside the Sewol Ferry
What	Actions taken by 'Who' <b>Announced, "Do not move from your current location,"</b> and, following the instructions of the late Chief Purser Yang Dae-Hong, <b>"Wear life jackets."</b>
How	Direct consequences following 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'

	<b>08111</b> Alias: Description: Captain Lee Seung-ho of the Sewol Ferry. The starting point of What: At 8:55 PM on April 16, 2014. Where: In the eastern coast of Jeollanam-do, South Korea. Why: The vessel was carrying 476 passengers, 308 of whom were high school students, 192 teachers, 190 soldiers, and 2,067 tons of cargo onboard.
	<b>08111</b> Alias: Description: The Sewol Ferry (001) was responsible for completion. The starting point of What: At approximately 8:40 AM on April 16, 2014. Where: In the eastern coast of Jeollanam-do, South Korea. Why: The vessel was carrying 476 passengers, 308 of whom were high school students, 192 teachers, 190 soldiers, and 2,067 tons of cargo onboard.
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	<b>08111</b> Alias: Description: The Sewol Ferry (001) was responsible for completion. The starting point of What: At approximately 8:40 AM on April 16, 2014. Where: In the eastern coast of Jeollanam-do, South Korea. Why: The vessel was carrying 476 passengers, 308 of whom were high school students, 192 teachers, 190 soldiers, and 2,067 tons of cargo onboard.

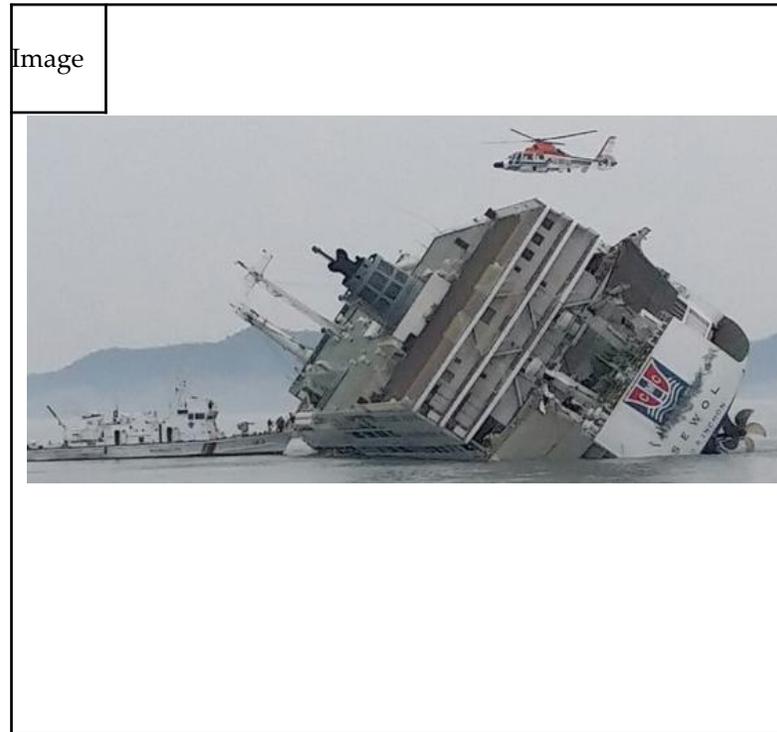
# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)



	E5W1H Alias	Description
Who	Actors	<b>Captain</b> Lee Joon-Seok of the Sewol ferry and his <b>crew</b> members
When	The starting point of 'What'	<b>At 9:46 AM</b> on April 16, 2014
Where	Location where 'What' occurs	Inside the Sewol Ferry
What	Actions taken by 'Who'	<b>Escaped alone from the ferry without issuing an evacuation order, leaving passengers behind.</b>
How	Direct consequences following 'What'	This ultimately resulted in making it impossible for the passengers to escape on their own.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)

E5W1H Alias		Description
Who	Hazards	<b>Seawater</b> flooding into the vessel through gaps in the hull openings and other structural crevices.
When	The starting point of 'What'	At <b>10:25 AM</b> on April 16, 2014.
Where	Location where 'What' occurs	In the waters north of Byeongpungdo, Jindo-gun, Jeollanam-do.
What	Emergencies caused by 'Who'	<b>Made the ferry capsize</b> with a lateral inclination of about 108 degrees.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	



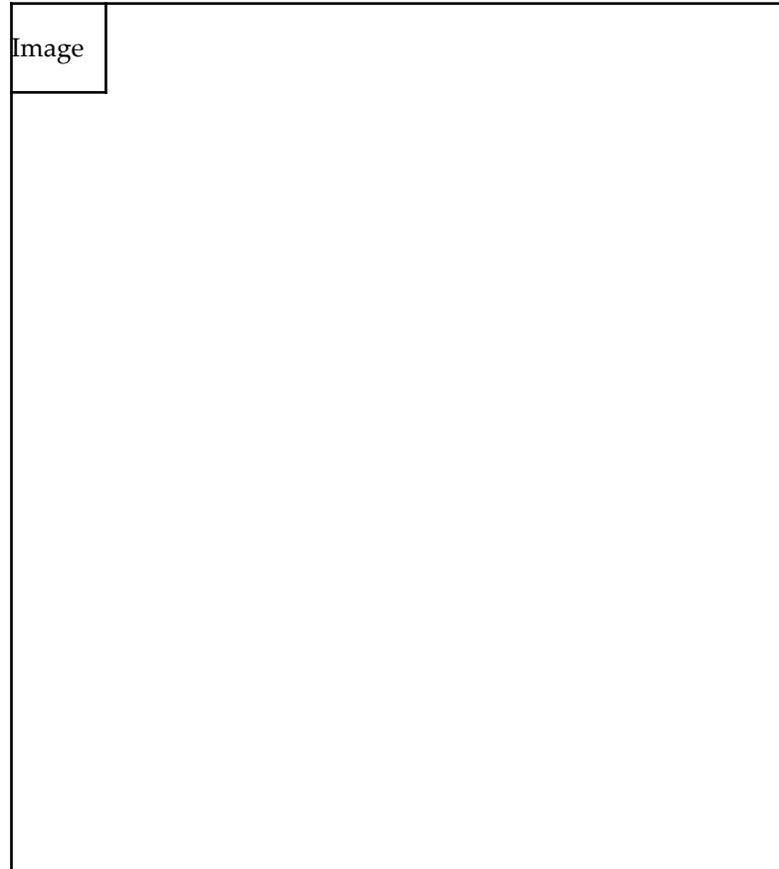

The grid contains various elements including:

- Small photographs of the ferry and rescue operations.
- Map screenshots showing the ferry's location and movement.
- Text boxes with detailed descriptions of the incident, such as:
  - 08:49:09 034.65**: A screenshot of a map showing the ferry's position at 08:49:09 on April 16, 2014, at approximately 34.65°N, 127.17°E.
  - 09:28:13 45.65**: A screenshot of a map showing the ferry's position at 09:28:13 on April 16, 2014, at approximately 35.65°N, 127.17°E.
  - 09:28:13 45.65**: A screenshot of a map showing the ferry's position at 09:28:13 on April 16, 2014, at approximately 35.65°N, 127.17°E.
  - 09:28:13 45.65**: A screenshot of a map showing the ferry's position at 09:28:13 on April 16, 2014, at approximately 35.65°N, 127.17°E.
  - 09:28:13 45.65**: A screenshot of a map showing the ferry's position at 09:28:13 on April 16, 2014, at approximately 35.65°N, 127.17°E.

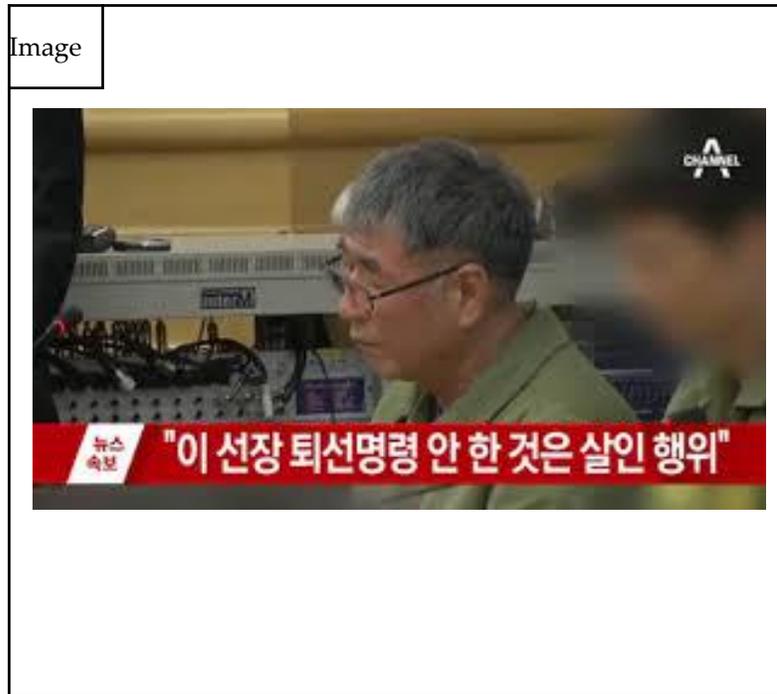


# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)

E5W1H Alias		Description
Who	Hazards	<b>The capsizing and sinking of the Sewol ferry</b>
When	The starting point of 'What'	On April 16, 2014
Where	Location where 'What' occurs	In the waters north of Byeongpungdo, Jindo-gun, Jeollanam-do
What	Emergencies caused by 'Who'	<b>Claimed 302 lives (including 250 of 325 students, 9 of 11 teachers, 32 of 108 civilians, and 9 of 29 crew members)</b>
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	



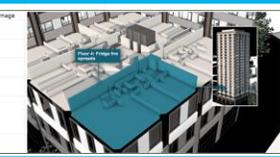
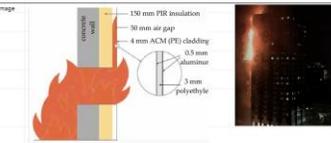
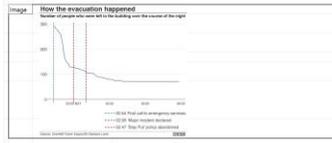
# DPP of the Sewol Ferry Tragedy in Korea (Scene#2)



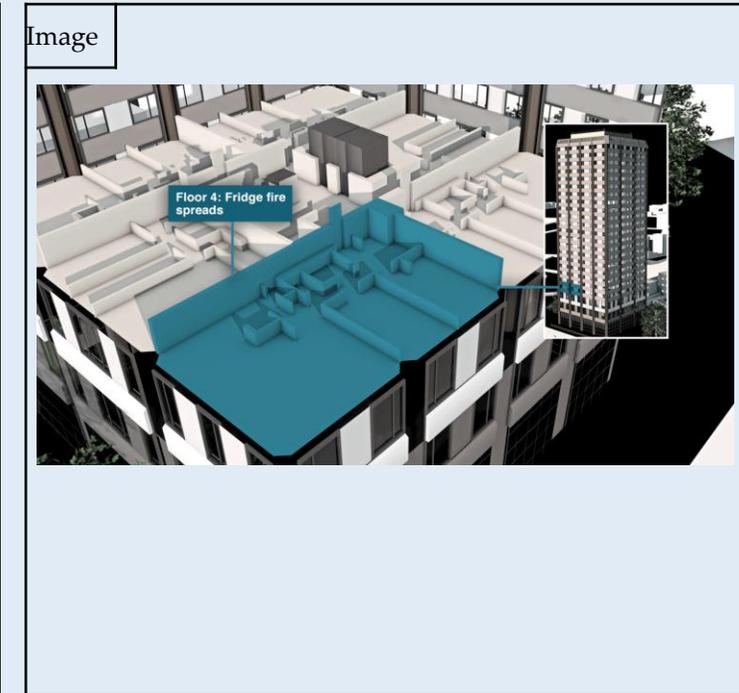
E5W1H Alias		Description
Who	Actors	<b>Captain</b> Lee Joon-Seok of the Sewol ferry
When	The starting point of 'What'	On December 12, <b>2015</b>
Where	Location where 'What' occurs	In the Supreme Court of South Korea
What	Actions taken by 'Who'	Was unanimously sentenced to <b>life imprisonment</b> by the Supreme Court.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Captain Lee's Failure to Issue Evacuation Order Amounts to Murder
Sequel	Cascading consequences resulting from 'How'	

# DPP of the 2017 Grenfell Tower Fire (Scene#1)

7 Scenes

Hazard Alias	Description	Image
Who: Hazards When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	A fire On June 14, 2017 At the West London tower block Broke out in the kitchen of a fourth floor flat at the 23 storey Grenfell tower	
Who: Actors When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	999 call handlers working for the LFB (London Fire Brigade) At 00:54 AM On June 14, 2017 In the Grenfell Tower Told residents not directly affected by fire, heat or smoke to remain in their flat until help arrived	
Who: Actors When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	North Kensington Unit of the LFB At 00:52 AM On June 14, 2017 At the Grenfell Tower Arrived	
Who: Hazards When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	The fire At 1:19 AM on June 14, 2017 At the West London tower block In less than 20 minutes, climbed 23 storeys to the top of the tower, fuelled by the flammable materials In the case at Grenfell Tower, as part of a refurbishment, combustible cladding and insulation had been fitted on the outside of the building	
Who: Actors When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	Judy Bice, a London Fire Assistant Commissioner At 2:30 AM on June 14, 2017 At the West London tower block Arrived and felt his disbelief and horror to find three sides of the building alight People were screaming	
Who: Actors When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	Judy Bice, a London Fire Assistant Commissioner At 2:47 AM on June 14, 2017, one hour and 53 minutes after the first emergency call At the West London tower block Gave the order to revoke the 'stay put' policy	
Who: Hazards When: The starting point of 'What' Where: Location where 'What' occurs What: Emergencies caused by 'Who' How: Direct consequences following 'What' Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Sequel: Cascading consequences resulting from 'How'	The fire On June 14, 2017 At the West London tower block Killed 72 people	

Hazard Alias	Description
Who: Hazards	<b>A fire</b>
When: The starting point of 'What'	On June 14, 2017
Where: Location where 'What' occurs	At the West London tower block
What: Emergencies caused by 'Who'	<b>Broke out in the kitchen of a fourth floor flat at the 23 storey Grenfell tower</b>
How: Direct consequences following 'What'	The fire was reported to 999.
Why: Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel: Cascading consequences resulting from 'How'	

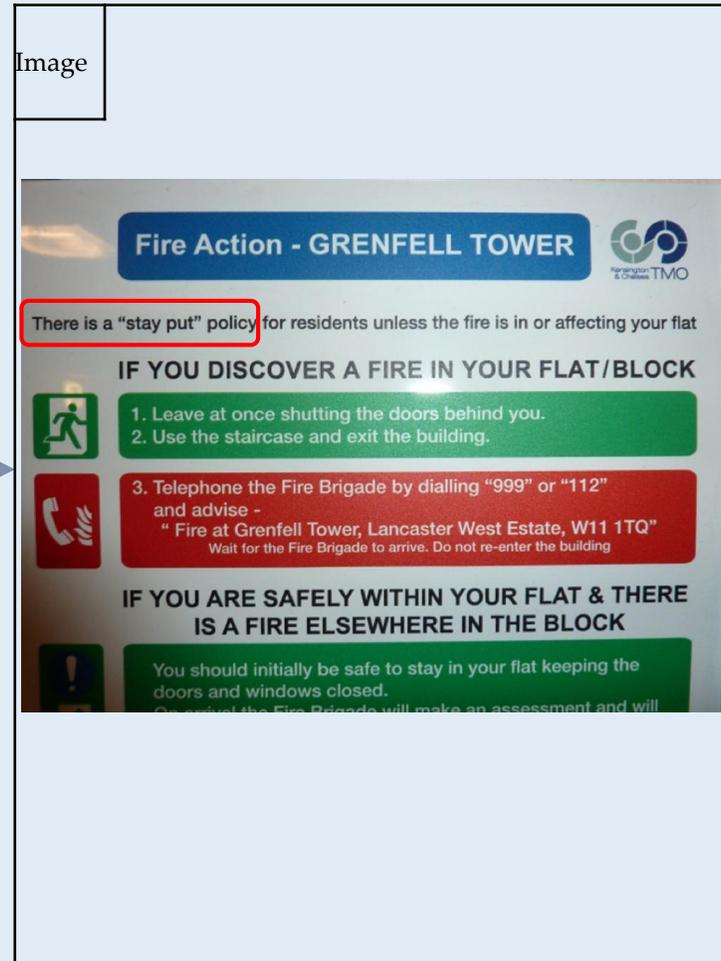


# DPP of the 2017 Grenfell Tower Fire (Scene#2)

Hazard		Action	
Who	Hazards	Who	Actors
When	The starting point of 'What'	When	The starting point of 'What'
Where	Location where 'What' occurs	Where	Location where 'What' occurs
What	Emergencies caused by 'What'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Direct consequences following 'What'
Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

Image	



Action Alias		Description
Who	Actors	<b>999 call handlers</b> working for the LFB (London Fire Brigade)
When	The starting point of 'What'	At <b>00:54 AM</b> On June 14, 2017
Where	Location where 'What' occurs	In the Grenfell Tower
What	Actions taken by 'Who'	<b>Told residents</b> not directly affected by fire, heat or smoke to <b>remain in their flats</b> until help arrived
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	The effectiveness of " <b>stay put</b> " - which remains the policy in the event of fire in most high-rise buildings - <b>relies on a building being properly constructed</b> . Regulations should prevent <b>fire spreading from one flat to another for at least 60 minutes</b> .
Sequel	Cascading consequences resulting from 'How'	

# DPP of the 2017 Grenfell Tower Fire (Scene#3)

Hazard		Action	
Who	Alas	Who	Alas
Who	Hazards	Who	Alas
When	The starting point of 'What'	When	The starting point of 'What'
Where	Location where 'What' occurs	Where	Location where 'What' occurs
What	Emergencies caused by 'What'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Direct consequences following 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

Image		Who	Actors	Description
		When	The starting point of 'What'	At 00:54 AM On June 14, 2017
		Where	Location where 'What' occurs	In the Grenfell Tower
		What	Actions taken by 'Who'	Told residents not directly affected by fire, heat or smoke to remain in their flat until help arrived
		How	Direct consequences following 'What'	The effectiveness of 'stay put' - which remains fire policy in the event of fire in most high-rise buildings - relies on a building being properly constructed. Regulations should prevent fire spreading from one flat to another for at least 90 minutes.
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

Image		Who	Actors	Description
		When	The starting point of 'What'	At 00:55 AM On June 14, 2017
		Where	Location where 'What' occurs	At the Grenfell Tower
		What	Actions taken by 'Who'	Arrived
		How	Direct consequences following 'What'	
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

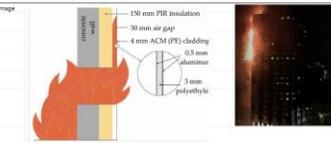
Image		Who	Alas	Description
		When	The starting point of 'What'	At 1:19 AM on June 14, 2017
		Where	Location where 'What' occurs	At the West London tower block
		What	Emergencies caused by 'What'	In less than 20 minutes, climbed 23 stories to the top of the tower, fueled by the flammable materials
		How	Direct consequences following 'What'	In the case at Grenfell Tower, as part of a refurbishment, combustible cladding and insulation had been fitted on the outside of the building
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

Image		Who	Alas	Description
		When	The starting point of 'What'	At 2:30 AM on June 14, 2017
		Where	Location where 'What' occurs	At the West London tower block
		What	Actions taken by 'Who'	Arrived and felt his disbelief and horror to find three sides of the building alight.
		How	Direct consequences following 'What'	People were screaming
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

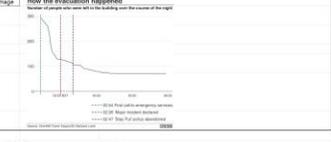
Image		Who	Alas	Description
		When	The starting point of 'What'	At 2:47 AM on June 14, 2017, one hour and 53 minutes after the first emergency call
		Where	Location where 'What' occurs	At the West London tower block
		What	Actions taken by 'Who'	Gave the order to revoke the 'stay put' policy
		How	Direct consequences following 'What'	
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

Image		Who	Alas	Description
		When	The starting point of 'What'	On June 14, 2017
		Where	Location where 'What' occurs	At the West London tower block
		What	Emergencies caused by 'What'	Killed 72 people
		How	Direct consequences following 'What'	
		Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
		Sequel	Cascading consequences resulting from 'How'	

Image



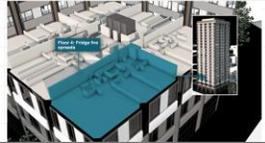
**Fire crews sent to Grenfell Tower fire**

- 00:54 - Fire reported
- 00:55 - North Kensington
- 00:59 - Hammersmith and Kensington
- 01:15 - Paddington
- 01:19 - Paddington 'aerial' ladder

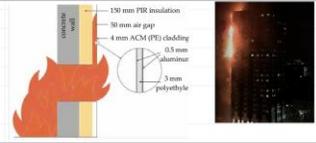
Who	Actors	North Kensington unit of the <b>LFB</b>
When	The starting point of 'What'	At <b>00:55</b> AM On June 14, 2017
Where	Location where 'What' occurs	At the Grenfell Tower
What	Actions taken by 'Who'	<b>Arrived.</b>
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	



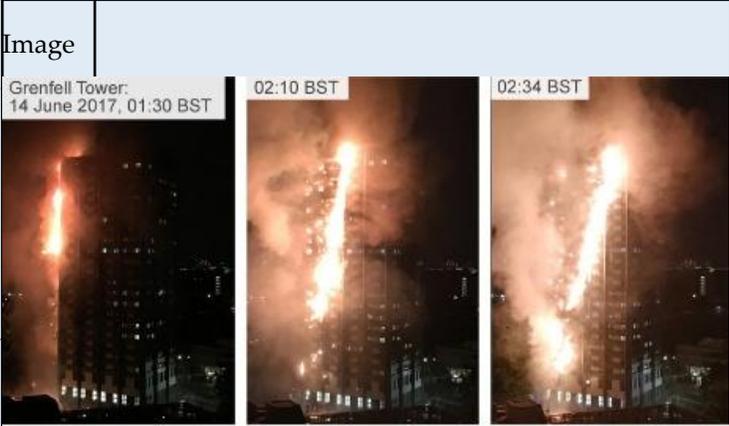
# DPP of the 2017 Grenfell Tower Fire (Scene#5)

Hazard		Action	
Who: Hazards	Description: A fire	Image	
When: The starting point of 'What'	On June 14, 2017	Action: Alias: Description	
Where: Location where 'What' occurs	At the West London tower block	Who: Actors	999 call handlers working for the LFB (London Fire Brigade)
What: Emergencies caused by 'What'	Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	When: The starting point of 'What'	At 00:54 AM On June 14, 2017
How: Direct consequences following 'What'	The fire was reported to 999	Where: Location where 'What' occurs	In the Grenfell Tower
Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'		What: Actions taken by 'Who'	Tell residents not directly affected by fire, heat or smoke to remain in their flat until help arrived
Sequel: Cascading consequences resulting from 'How'		How: Direct consequences following 'What'	
Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'		Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	The effectiveness of 'stay put' - which remains fire policy in the event of fire in most high-rise buildings - relies on a building being properly constructed. Regulations should prevent fire spreading from one flat to another for at least 90 minutes.
Sequel: Cascading consequences resulting from 'How'		Sequel: Cascading consequences resulting from 'How'	

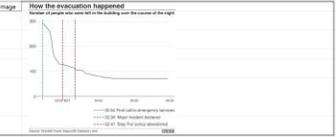
  

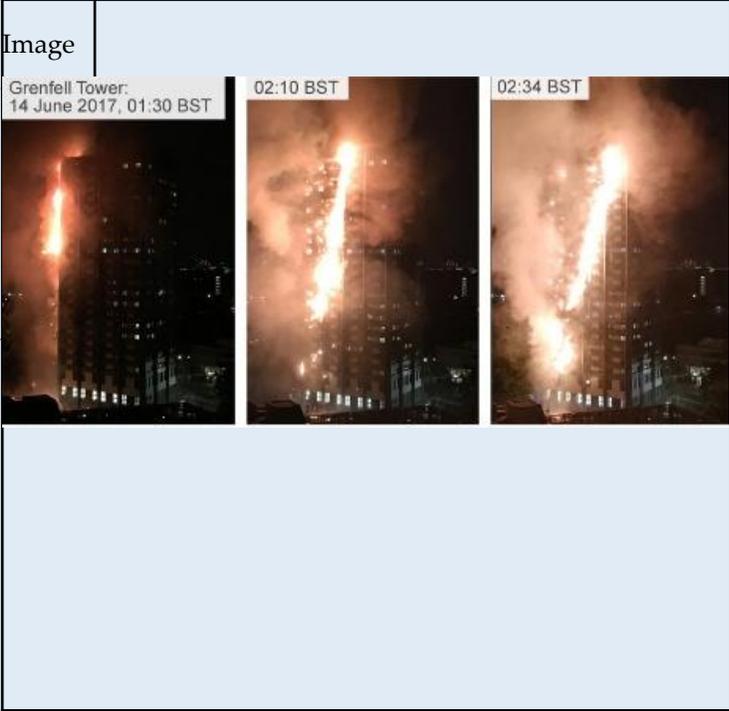
Hazard		Action	
Who: Hazards	Description: The fire	Image	
When: The starting point of 'What'	At 1:19 AM on June 14, 2017	Action: Alias: Description	North Kensington unit of the LFB
Where: Location where 'What' occurs	At the West London tower block	When: The starting point of 'What'	At 00:50 AM On June 14, 2017
What: Emergencies caused by 'What'	In less than 20 minutes, climbed 23 storeys to the top of the tower, fuelled by the flammable materials	Where: Location where 'What' occurs	At the Grenfell Tower
How: Direct consequences following 'What'		What: Actions taken by 'Who'	Arrived
Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	In the case at Grenfell Tower, as part of a refurbishment, combustible cladding and insulation had been fitted on the outside of the building	How: Direct consequences following 'What'	
Sequel: Cascading consequences resulting from 'How'		Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	
Sequel: Cascading consequences resulting from 'How'		Sequel: Cascading consequences resulting from 'How'	

Hazard		Action	
Who: Hazards	Description: The fire	Image	
When: The starting point of 'What'	At 1:19 AM on June 14, 2017	Action: Alias: Description	Andy Roe, a London Fire Assistant Commissioner
Where: Location where 'What' occurs	At the West London tower block	When: The starting point of 'What'	At 2:30 AM on June 14, 2017
What: Emergencies caused by 'What'		Where: Location where 'What' occurs	At the West London tower block
How: Direct consequences following 'What'		What: Actions taken by 'Who'	Arrived and felt his disbelief and horror to find three sides of the building alight.
Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'		How: Direct consequences following 'What'	People were screaming
Sequel: Cascading consequences resulting from 'How'		Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	
Sequel: Cascading consequences resulting from 'How'		Sequel: Cascading consequences resulting from 'How'	

Hazard		Action	
Who: Hazards	Description: The fire	Image	
When: The starting point of 'What'	On June 14, 2017	Action: Alias: Description	Andy Roe, a London Fire Assistant Commissioner
Where: Location where 'What' occurs	At the West London tower block	When: The starting point of 'What'	At 2:47 AM on June 14, 2017, one hour and 53 minutes after the first emergency call
What: Emergencies caused by 'What'	Killed 72 people	Where: Location where 'What' occurs	At the West London tower block
How: Direct consequences following 'What'		What: Actions taken by 'Who'	Gave the order to revoke the 'stay put' policy
Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'		How: Direct consequences following 'What'	
Sequel: Cascading consequences resulting from 'How'		Why: Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	
Sequel: Cascading consequences resulting from 'How'		Sequel: Cascading consequences resulting from 'How'	



Action Alias	Description
Who	Actors Andy Roe, a <b>London Fire Assistant Commissioner</b>
When	The starting point of 'What' <b>At 2:30</b> AM on June 14, 2017
Where	Location where 'What' occurs At the West London tower block
What	Actions taken by 'Who' <b>Arrived</b> and felt his disbelief and horror to find three sides of the building alight.
How	Direct consequences following 'What' People were screaming
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'



# DPP of the 2017 Grenfell Tower Fire (Scene#6)

Hazard		Action	
Who	Hazards	Who	Actors
When	The starting point of 'What'	When	The starting point of 'What'
Where	Location where 'What' occurs	Where	Location where 'What' occurs
What	Emergencies caused by 'How'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Direct consequences following 'What'
Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

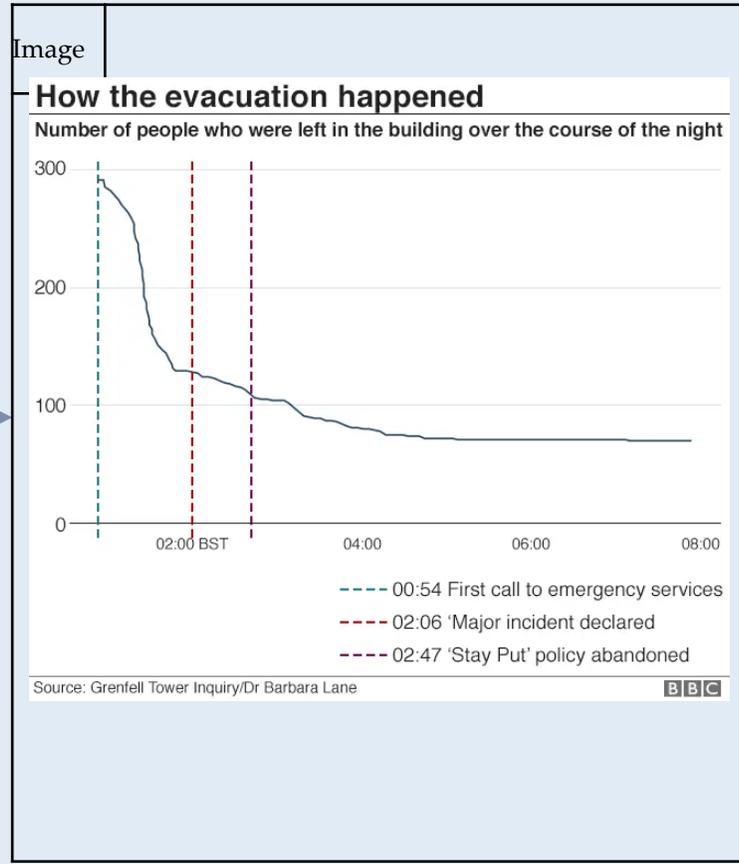
Image		Image	
Image		Image	
Image		Image	

Hazard		Action	
Who	Hazards	Who	Actors
When	The starting point of 'What'	When	The starting point of 'What'
Where	Location where 'What' occurs	Where	Location where 'What' occurs
What	Emergencies caused by 'How'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Direct consequences following 'What'
Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

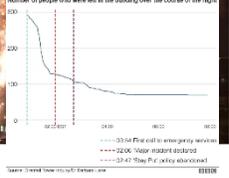
  

Hazard		Action	
Who	Hazards	Who	Actors
When	The starting point of 'What'	When	The starting point of 'What'
Where	Location where 'What' occurs	Where	Location where 'What' occurs
What	Emergencies caused by 'How'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Direct consequences following 'What'
Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How' if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

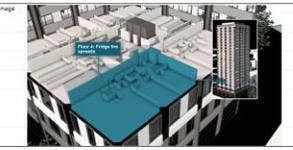


Action Alias		Description
Who	Actors	Andy Roe, a <b>London Fire Assistant Commissioner</b>
When	The starting point of 'What'	At 2:47 AM on June 14, 2017, <b>one hour and 53 minutes after</b> the first emergency call
Where	Location where 'What' occurs	At the West London tower block
What	Actions taken by 'Who'	Gave the order to <b>revoke the "stay put" policy</b>
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

# DPP of the 2017 Grenfell Tower Fire (Scene#6)



Hazard		Action	
Who	Description	Who	Description
Hazards	A fire	Actors	999 call handlers working for the LFB (London Fire Brigade)
When	The starting point of 'What' On June 14, 2017	When	The starting point of 'What' At 00:54 AM On June 14, 2017
Where	Location where 'What' occurs At the West London tower block	Where	Location where 'What' occurs In the Grenfell Tower
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Told residents not directly affected by fire, heat or smoke to remain in their flat until help arrived
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The effectiveness of 'stay put' - which remains the policy in the event of fire in most high-rise buildings - relies on a building being properly constructed. Regulations should prevent fire spreading from one flat to another for at least 90 minutes.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

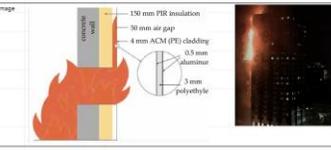


Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	South Kensington Unit of the LFB
When	The starting point of 'What' At 00:55 AM On June 14, 2017	When	The starting point of 'What' At 00:55 AM On June 14, 2017
Where	Location where 'What' occurs At the Grenfell Tower	Where	Location where 'What' occurs At the Grenfell Tower
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Arrived
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The effectiveness of 'stay put' - which remains the policy in the event of fire in most high-rise buildings - relies on a building being properly constructed. Regulations should prevent fire spreading from one flat to another for at least 90 minutes.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

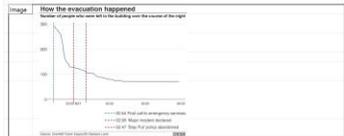


Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	South Kensington Unit of the LFB
When	The starting point of 'What' At 00:55 AM On June 14, 2017	When	The starting point of 'What' At 00:55 AM On June 14, 2017
Where	Location where 'What' occurs At the Grenfell Tower	Where	Location where 'What' occurs At the Grenfell Tower
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Arrived
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The effectiveness of 'stay put' - which remains the policy in the event of fire in most high-rise buildings - relies on a building being properly constructed. Regulations should prevent fire spreading from one flat to another for at least 90 minutes.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	170 mm PIR insulation
When	The starting point of 'What' At 1:19 AM on June 14, 2017	When	The starting point of 'What' At 1:19 AM on June 14, 2017
Where	Location where 'What' occurs At the West London tower block	Where	Location where 'What' occurs At the West London tower block
What	Emergencies caused by 'Who' In less than 20 minutes, climbed 23 stories to the top of the tower, fueled by the flammable materials	What	Actions taken by 'Who' In less than 20 minutes, climbed 23 stories to the top of the tower, fueled by the flammable materials
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The fire was reported to 999
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' In the case at Grenfell Tower, as part of a refurbishment, combustible cladding and insulation had been fitted on the outside of the building	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' In the case at Grenfell Tower, as part of a refurbishment, combustible cladding and insulation had been fitted on the outside of the building
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

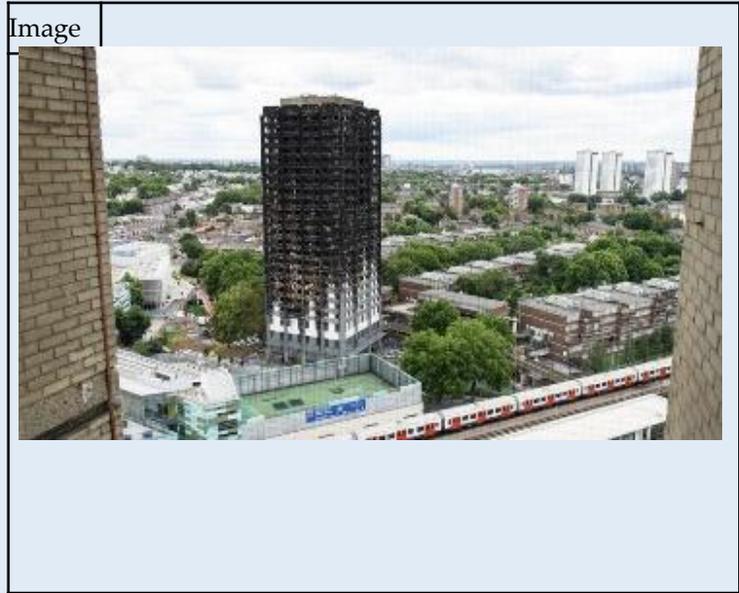


Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	Andy Roe, a London Fire Assistant Commissioner
When	The starting point of 'What' At 2:30 AM on June 14, 2017	When	The starting point of 'What' At 2:30 AM on June 14, 2017
Where	Location where 'What' occurs At the West London tower block	Where	Location where 'What' occurs At the West London tower block
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Arrived and felt his distaste and horror to find three sides of the building afloat
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' People were screaming
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'



Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	Andy Roe, a London Fire Assistant Commissioner
When	The starting point of 'What' At 2:47 AM on June 14, 2017, one hour and 53 minutes after the first emergency call	When	The starting point of 'What' At 2:47 AM on June 14, 2017, one hour and 53 minutes after the first emergency call
Where	Location where 'What' occurs At the West London tower block	Where	Location where 'What' occurs At the West London tower block
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Gave the order to revoke the 'stay put' policy
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The fire was reported to 999
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

	Hazard Alias	Description
Who	Hazards	<b>The fire</b>
When	The starting point of 'What'	On June 14, 2017
Where	Location where 'What' occurs	At the West London tower block
What	Emergencies caused by 'Who'	<b>Killed 72</b> of 295 residents
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

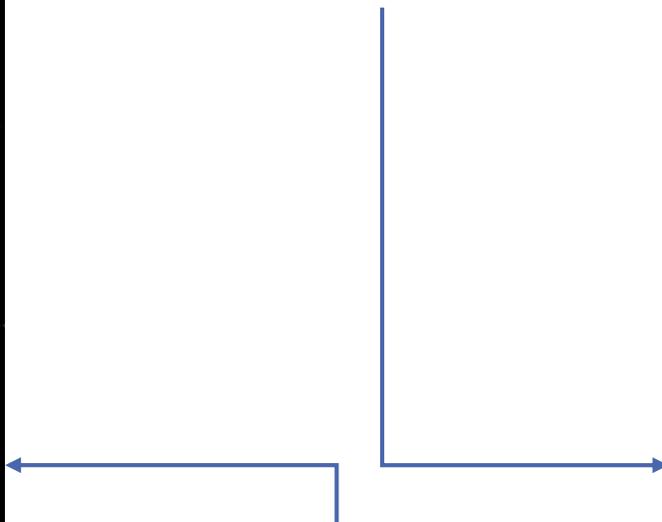


Hazard		Action	
Who	Description	Who	Description
Hazards	The fire	Actors	Andy Roe, a London Fire Assistant Commissioner
When	The starting point of 'What' On June 14, 2017	When	The starting point of 'What' On June 14, 2017
Where	Location where 'What' occurs At the West London tower block	Where	Location where 'What' occurs At the West London tower block
What	Emergencies caused by 'Who' Smoke out in the kitchen of a fourth floor flat at the 23-storey Grenfell tower	What	Actions taken by 'Who' Gave the order to revoke the 'stay put' policy
How	Direct consequences following 'What' The fire was reported to 999	How	Direct consequences following 'What' The fire was reported to 999
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'





On September 16, **2022**  
**China** Telecom Tower  
(**42-floor** building) Fire  
**No deaths reported**



Unlike some countries,  
**Korea does not have a**  
**'stay put' policy** in the  
event of block fires.

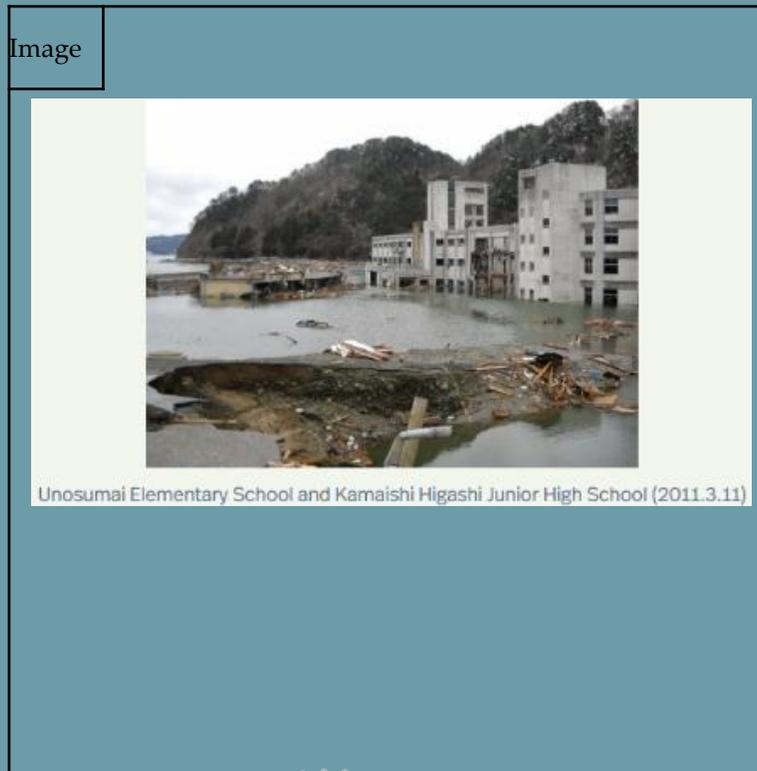
On October 8, **2020**  
**Korean** Samhwan Art  
Nouveau Tower (**33-floor**  
building) Fire  
**No deaths**







# DPP of the 2011 Kamaishi Miracle (Scene#3)



	Action Alias	Description
Who	Actors	<b>Students</b> doing sports activities in the schoolyard
When	The starting point of 'What'	On March 11, 2011
Where	Location where 'What' occurs	At Kamaishi Higashi Junior High School
What	Actions taken by 'Who'	<b>Shouted loudly</b> towards the school building, " <b>A tsunami is coming! Run away!</b> " and ran away from the school.
How	Direct consequences following 'What'	
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	
Sequel	Cascading consequences resulting from 'How'	

Hazard		Action	
Image		Image	
Alias	An earthquake	Alias	The vice principal of Kamaishi Higashi Junior High School
Who	The starting point of 'What'	Who	Actors
When	At 2:46 PM on March 11, 2011	When	The starting point of 'What'
Where	In Unosumai, Kamaishi, Iwate	Where	Location where 'What' occurs
What	Emergencies caused by 'How'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The students of Unosumai Elementary School
Who	The starting point of 'What'	Who	Actors
When	On March 11, 2011	When	The starting point of 'What'
Where	At Kamaishi Higashi Junior High School	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The junior high and elementary school students of Kamaishi Higashi and Unosumai
Who	The starting point of 'What'	Who	Actors
When	On March 11, 2011	When	The starting point of 'What'
Where	At Unosumai Elementary School, adjacent to Kamaishi Higashi Junior High School	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The junior high school students
Who	The starting point of 'What'	Who	Actors
When	On March 11, 2011	When	The starting point of 'What'
Where	At an elderly welfare facility, which was designated as an evacuation site	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The elementary school students and even assisted nursery teachers
Who	The starting point of 'What'	Who	Actors
When	Only 30 seconds after all students arrived at the second evacuation site	When	The starting point of 'What'
Where	At the second evacuation site	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The elementary school students and even assisted nursery teachers
Who	The starting point of 'What'	Who	Actors
When	Only 30 seconds after all students arrived at the second evacuation site	When	The starting point of 'What'
Where	At the second evacuation site	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'
Image		Image	
Alias	A tsunami	Alias	The elementary school students and even assisted nursery teachers
Who	The starting point of 'What'	Who	Actors
When	Only 30 seconds after all students arrived at the second evacuation site	When	The starting point of 'What'
Where	At the second evacuation site	Where	Location where 'What' occurs
What	Actions taken by 'Who'	What	Actions taken by 'Who'
How	Direct consequences following 'What'	How	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'	Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'	Sequel	Cascading consequences resulting from 'How'

# DPP of the 2011 Kamaishi Miracle (Scene#4)



Action Alias	Description
Who	Actors The students of <b>Unosumai Elementary School</b>
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs At Unosumai Elementary School, adjacent to Kamaishi Higashi Junior High School
What	Actions taken by 'Who' Initially attempted to evacuate to the third floor of their school building, but changed their action when they <b>saw the junior high school students</b> —who had participated in a joint evacuation drill—running outside.
How	Direct consequences following 'What' They then ran downstairs, <b>following the junior high school students.</b>
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' They were in danger, following the junior high school students.
Sequel	Cascading consequences resulting from 'How' Nearby residents noticed the evacuating students and followed them to safety.

Alias	Description
Who	Actors The students of Unosumai Elementary School
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs At Unosumai Elementary School, adjacent to Kamaishi Higashi Junior High School
What	Actions taken by 'Who' Initially attempted to evacuate to the third floor of their school building, but changed their action when they saw the junior high school students—who had participated in a joint evacuation drill—running outside.
How	Direct consequences following 'What' They then ran downstairs, following the junior high school students.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' They were in danger, following the junior high school students.
Sequel	Cascading consequences resulting from 'How' Nearby residents noticed the evacuating students and followed them to safety.

Alias	Description
Who	Actors The principal of Kamaishi Higashi Junior High School
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs At Kamaishi Higashi Junior High School
What	Actions taken by 'Who' Attempted to announce an evacuation via the school's broadcasting system but was unable to do so because of a power outage.
How	Direct consequences following 'What' Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Other students heard the shouting and followed them.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' Other students heard the shouting and followed them.
Sequel	Cascading consequences resulting from 'How' Other students heard the shouting and followed them.

Alias	Description
Who	Actors The students of Unosumai Elementary School
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs At Unosumai Elementary School, adjacent to Kamaishi Higashi Junior High School
What	Actions taken by 'Who' Initially attempted to evacuate to the third floor of their school building, but changed their action when they saw the junior high school students—who had participated in a joint evacuation drill—running outside.
How	Direct consequences following 'What' They then ran downstairs, following the junior high school students.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' They were in danger, following the junior high school students.
Sequel	Cascading consequences resulting from 'How' Nearby residents noticed the evacuating students and followed them to safety.

Alias	Description
Who	Actors The junior high and elementary school students of Kamaishi Higashi and Unosumai
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs An elderly welfare facility, which was designated as an evacuation site
What	Actions taken by 'Who' Arrived safely at the designated evacuation site
How	Direct consequences following 'What' They arrived safely at the designated evacuation site
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' They were in danger, following the junior high school students.
Sequel	Cascading consequences resulting from 'How' Nearby residents noticed the evacuating students and followed them to safety.

Alias	Description
Who	Actors Some junior high school students
When	The starting point of 'What' On March 11, 2011
Where	Location where 'What' occurs At an elderly welfare facility designated as an evacuation site
What	Actions taken by 'Who' Discovered that all were the family following the evacuating students making a noise causing a large splash and smoke rising from damaged fixtures nearby.
How	Direct consequences following 'What' They informed the teachers who were checking attendance, "It's not safe here!" and suggested evacuating to a safer facility located on higher ground.
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What' They were in danger, following the junior high school students.
Sequel1	Cascading consequences resulting from 'How' On the way to the second evacuation site, the junior high school students held the hands of the elementary school students and even assisted nursery teachers evacuating children from a nearby nursery school.
Sequel2	Cascading consequences resulting from 'How' Nearby residents noticed the evacuating students and followed them to safety.

# DPP of the 2011 Kamaishi Miracle (Scene#5)



Action Alias	Description
Who	Actors
When	The starting point of 'What'
Where	Location where 'What' occurs
What	Actions taken by 'Who'
How	Direct consequences following 'What'
Why	Reasons or causes for 'How'; if 'How' is unspecified, then for 'What'
Sequel	Cascading consequences resulting from 'How'

Hazard		Action	
Image		Image	





# Results

Disasters	Lead time (min)	Commanders (Leaders)	Followers (Individuals)	Deaths
Okawa Elementary School Tragedy	<b>31 min</b> (2:59 - 3:30 PM)	The on-site commander wasted a significant amount of time interpreting the phrase 'vacant land near school, or park, etc.' as written in the manual. As a result, he ultimately misinterpreted it and took incorrect evacuation actions.	They wasted time waiting for the commander's instructions and took no proactive actions to obtain updated information on the emergency situation.	74 of 78 students (MR=94.9%) 10 of 11 teachers (MR=90.9%)  Where <b>MR means mortality rate.</b>
Sewol Ferry Tragedy	<b>57 min</b> (8:49 - 9:46 AM)	The captain and crew ordered passengers to remain on board but <b>did not give the passengers an evacuation order until they themselves disembarked.</b>	<b>Most of the students and teachers actively followed the crew's instructions until the end.</b> However, it is presumed that many <b>civilians did not fully comply with the crew's orders.</b>	250 of 325 students (MR=77.0%) 9 of 11 teachers (MR=81.8%), 32 of 108 civilians (MR=29.6%), 9 of 29 crews (MR=31.0%)
Grenfell Tower Fire	<b>25 min</b> (0:54 - 1:19 AM)	LFB (London Fire Brigade) adhered to the standard evacuation guideline (stay put). <b>Even though they recognized early that the situation was different,</b> the 'stay put' policy remained unchanged.	<b>In the early stages of a fire, when evacuation is possible, the "stay put" policy is followed.</b> However, during later stages, when evacuation becomes difficult, some individuals attempt to evacuate.	72 of 295 residents (MR=24.4%)
Kamaishi Miracle	<b>10 min</b>	<b>The commanders accepted the followers' judgment.</b> At certain points, they ended up becoming followers themselves.	<b>The followers observed the tsunami continuously and shouted loudly,</b> "A tsunami is coming! Run away!" took the lead and started fleeing. Seeing this, all the other followers also followed. They expressed their judgment to their commanders.	No victims (MR=0%)

# Conclusion

- From the findings of these cases, I suggest that :
  - **For on-site commanders**
    - They must clearly understand **the scenarios upon which the instructions or policies in their manuals or plans are based.**
    - In an emergency, they need to continuously monitor **whether the current situation remains within these anticipated scenarios.**
    - If the situation remains within the expected range, they should maintain the existing course of action;
    - However, **if conditions deviate**, commanders must **promptly adjust or revoke previous instructions or policies** accordingly.
  - **For followers**
    - In emergencies, most people are likely to be followers. However, no matter how urgent the situation may be, we must not abandon our sense of agency.
    - **Simply waiting for instructions without acting is no different from surrendering our autonomy.**
    - **Followers should actively observe situational changes** and report them to commanders to facilitate timely and appropriate actions.

